



**Project acronym:** CryoCells

**Project title:** Studying algal cell biomembranes to understand their adaptation to life on snow and ice

**Project leader:** Helen Feord, GFZ Helmholtz Potsdam, Germany

**Discipline:** Life Sciences & Biotech: Molecular and cellular biology

**Station(s):** Finse Alpine Research Centre (Norway)

Microbial communities dominated by eukaryotic algae thrive on snow and ice in alpine and polar environments. This project aims to understand how these cryogenic microalgal species adapt to the “stressful” and fast changing environments on snow and ice surfaces, which include high light, low nutrients, and cold temperatures. This proposal focuses on the characterisation of algal biomembranes adapted to life in the cryosphere, by quantifying membrane proteins and Intact Polar Lipids (IPLs) from field samples. Sampling will occur in early Summer 2023, during the beginning of the melt season to sample algae from their characteristic colourful blooms near the Finse Alpine Research Station in Norway. Snow (and possibly ice) algae samples will be collected on site, melted and filtered for DNA, protein, and IPL extractions upon return to the team's home institution (GFZ Potsdam, Germany). We will undertake field temperature, light, pH, and conductivity measurements and samples will also be filtered to quantify nutrient concentrations, allowing us to link lipid and protein profiles to specific abiotic conditions. DNA sequencing through metagenomics will also provide essential and complementary information on proteins and IPL identify and function, allowing us to build a full picture of the regulation and identity of the biomembrane components of algae adapted to snow and ice conditions. We therefore aim to answer both how membranes of cryogenic algae vary in molecular composition and structure from the membranes of well studied mesophilic algal species, and how such adaptations are plastic in response to the dynamic variations of environmental conditions in-situ.